

APR - 5 2006

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April 5, 2006
Stephano Horben

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Customer No. 00286
Serial No. 09/973,685
(Attorney Docket No. GP-300969-ATC-CD)

Filed October 9, 2001

Constantin Stancu
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Group 2834

MAXIMUM TORQUE-PER-AMPERE
CONTROL OF A SATURATED SURFACE-
MOUNTED PERMANENT MAGNET
MACHINE

Examiner David W. Scheuermann

REPLY BRIEF

Commissioner for Patents
PO Box 1450
Alexandria VA 22313-1450

Sir:

REPLY BRIEF FOR APPELLANT GENERAL MOTORS

General Motors is filing this Reply Brief in response to the Examiner's Answer dated March 23, 2006. Please charge the fee required by this Brief and any other fees which may be due to Deposit Account No. 07-0960.

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GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-6, and 8-12 stand rejected under 35 U.S.C. 103 as being unpatentable over U.S. Patent No. 6,378,367 to Iijima et al. in view of U.S. Patent No. 5,864,192 to Nagate et al.

ARGUMENT

On page 4 of the Final Office Action, the Examiner stated that Iijima et al. does not expressly disclose a control block to control either the d or q axis current components as a function of β . Applicants respectfully agree with this statement. In column 1, lines 48-51, Iijima et al. expressly discloses that the d and q axis magnetizing components are equal and therefore the second term of equation 2 in Iijima et al. is zero. Iijima et al. is silent with respect to, and in fact teaches away from, controlling the d or q axis components as a function of β , as Iijima expressly assumes that the d and q (L_d and L_q) axis magnetizing components are zero. The present invention recognizes that at high stator current levels, when the effects of magnetic saturation cannot be neglected, the two magnetizing inductances will have different values where L_d is not equal to L_q . In the present case, the difference ($L_d - L_q$) is not zero, and additional torque can be obtained from the motor by controlling the d and q axis current components as a function of β .

The Examiner on page 3 of the Examiner's Answer characterizes block 114, of Figure 18 of Iijima et al. as a function of the variable G_{ai} . G_{ai} is a gain variable, as is commonly known in the art and described in column 10, lines 35-40 of Iijima et al. Figure 18 merely discloses a current command based on acceleration value, rotation speed the degree of saturation, the reference value and the gains, as described in column 10, lines 35-40 of Iijima et al. The control system of Iijima et al. does not operate an electric motor/rotor in a magnetically saturated stated and, as previously described, the d and q (L_d and L_q) axis magnetizing components are considered to be zero.

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Iijima et al. is silent and in fact teaches away from controlling the d or q axis components as a function of β as Iijima et al. expressly assumes that the d and q (L_d and L_q) axis magnetizing components are zero. On page 4 of the Examiner's Answer, the Examiner stated that Iijima et al does not expressly disclose the limitation "... to control the d-axis current as a function of the angle β when said permanent magnet rotor is in magnetic saturation." Applicants respectfully agree with this statement. The present invention recognizes that at high stator current levels, when the effects of magnetic saturation cannot be neglected, the two magnetizing inductances can have different values where L_d is not equal to L_q . In these cases, the difference ($L_d - L_q$) is not zero, and additional torque can be obtained from the motor by controlling the d and q axis current components as a function of β .

Nagate et al. discloses using rare earth magnets to cause magnetic saturation. Applicants assert that Nagate et al. is completely silent with respect to controlling the d and q axis current as a function of the angle β to generate magnetic saturation. Nagate et al. discloses the use of a Hall effect sensor 16 to detect a leakage of magnetic flux. The magnetic saturation in Nagate et al. is generated by inserting high energy magnets, not by controlling the d and q axis currents, as disclosed in column 16, lines 29-44. Accordingly, the combination suggested by the Examiner does not teach or suggest the present invention, and there would be no motivation to combine the Iijima et al and Nagate et al. references. Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching suggestion or incentive supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577.

The Examiner by combining Iijima et al. and Nagate et al. is involved in improper speculation and conception of an invention based upon the cited prior art. In order to establish a prima facie case of obviousness, the Examiner must identify a suggestion or motivation to modify the teachings of the cited references to achieve the claimed invention. *In re Kotzab* 55 USPQ2d 1313, 1316-1317 (Fed. Cir. 2000). A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back

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to the time of the invention to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of hindsight syndrome wherein that which only the invention taught is used against its teacher." *In Re Kotzab*, 217 F.3d 1365. The Examiner has fallen victim to hindsight reconstruction and has also ignored the elements of the claimed invention and failed to explain how and why the claimed subject matter is rendered unpatentable over the prior art and point out where each of the specific limitations recited in the rejected claims is found in the prior art relied on.

Iijima et al. is silent and in fact teaches away from controlling the d or q axis components as a function of β , as Iijima expressly assumes that the d and q (L_d and L_q) axis magnetizing components are zero, as previously discussed. The suggested combination of the Examiner is improper, references cannot be combined where the reference teaches away from their combination. See MPEP Section 2145.

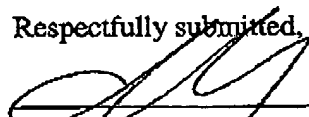
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SUMMARY

Iijima et al. and Nagate et al. singly or in combination do not teach or suggest the present claimed invention. Furthermore, the combinations suggest by the Examiner of Iijima et al. and Nagate et al. is improper. The Examiner has failed to explain how and why the claimed subject matter is rendered unpatentable over the prior art and point out where each of the specific limitations recited in the rejected claims is found in the prior art relied on. Applicants therefore request allowance of independent Claims 1-6, and 8-12.

Respectfully submitted,



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